

Eye Diseases

PREVENTION OF BLINDNESS
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Eye Conditions Prevalent in the School Age*

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The factors causing defective vision in children of school age may be listed as heredity; prenatal disease; defects in the shape of the eyeball; focal infections; childhood diseases; and accidents, according to the author, who discusses these subjects in this article.

IN order that first things may be set down first it should not be forgotten that some of the eye conditions which we see during school years are due to congenital or hereditary factors and that during this period of life little, in many instances, can be done except to minimize the disability which results. In other instances we are helpless and must direct our attention to the education of the child to the end that he may make the best possible use of whatever visual power remains. This education includes helping him to plan his life work along lines wherein his visual capacity may be used to the greatest advantage both to himself and to the community. It also includes the conservation of whatever vision he has when he comes under observation.

The prevention of the known hereditary conditions rests upon stringent laws and regulations, and their strict enforcement, to prevent the marriage and the begetting of children by the unfit and by those who are known to have, or whose family history indicates that they have, transmissible diseases, or any of the so-called familial diseases. No treatment and no hygienic regime can do other than minimize the damage of interstitial keratitis (a chronic variety of inflammation of the cornea with deep deposits in the substance of the cornea which

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becomes hazy throughout and has a ground-glass appearance), for example, which is due to hereditary syphilis. The same might be said for retinitis pigmentosa (inflammation of the retina or structure which records the image seen, marked by progressive hardening of the retina with discoloration and shrinkage) and to a lesser degree of congenital cataracts (an opacity or imperviousness to light rays by the lens of the eye which originated before birth), which have a tendency to appear in succeeding generations, though for the last condition operation for the removal of the cataract offers the hope of better vision.

From all this it is evident that these very deplorable eye conditions cannot be prevented by us nor in many cases can they be successfully treated. The remedy for them lies in a better and more widespread recognition of the possibility of their occurrence and the application of a sound system of eugenics.

Necessity for Good Hygienic Surroundings

Given a good heredity, the child cannot develop normally without proper guidance as to feeding, housing and clothing and the cultivation of good health habits. If we think of the eye, not as a thing apart from the rest of the body—a mere optical instrument like the camera, with which it has many points in common—but rather as a part of a living being, we cannot fail to be impressed with the fact that what is good for the body in general is good for the eyes, and what is bad for the body in general is bad for the eyes. With this in mind the need for proper feeding, clothing and housing will impress itself upon us as being quite as essential for the health and proper functioning of the eyes as it is for the general health.

Poorly nourished children, in bad hygienic surroundings, are particularly susceptible to certain forms of diseases of the eyes. For example, I have in mind that about three years ago we had at one of our hospitals more than 100 cases of follicular conjunctivitis (inflammation of the firm inner framework of connective tissue which gives shape to the eyelid) in children of school age all of whom came to us from an insti-

tution for children. More or less crowded, as is common in many institutions, they were living a sort of dull routine life as to food, exercise and general environment, which diminished their powers of resistance, and as a result they fell easy victims to the disease which, happily, was curable and left them with no visual crippling. Under happier environment, with wider variety of food, more attention to ordinary rules and less crowding of the children, this epidemic would not have occurred.

Focal Infections

Disease of one part of the body as the result of an infection in another part is coming to be recognized as common. Affections of the eyes are no exception to this rule and these so-called focal infections are the cause of a variety of diseases of the eye. For example, diseased tonsils, abscessed teeth and infections of the nasal sinuses may not only be the cause of such general conditions as chorea (a convulsive nervous disease—St. Vitus' dance), rheumatism, endocarditis (inflammation of a lining of the heart), etc., but iritis (inflammation of the iris or band of radiating fibers by which the pupil is dilated or contracted), keratitis, scleritis (inflammation of the tough white supporting tunic of the eyeball, covering it entirely except for the segment covered by the cornea), and other eye conditions are often directly traceable to them. It is imperative that the social worker and all interested in the conservation of vision keep these conditions in mind in order that they may be helpful in advising parents regarding them and their potentialities for harm.

Diseases of the Eye

Diseases of the eye occurring in the school age group may be divided into two classes: those showing external signs of inflammation and those exhibiting no such signs. In the latter group the only evidence that disease exists, in many cases, is the impairment of vision.

Diseases accompanied by external evidences of inflammation, to mention only a few of the commoner ones, includes diseases of the lids, such as styas and blepharitis (inflamma-

tion of the eyelids), and conjunctivitis in its various forms, keratitis, scleritis, and iritis. These are all accompanied by more or less redness, photophobia (abnormal intolerance of light), increased lacrimation (the secretion and discharge of tears), and pain of greater or lesser intensity. Cases of conjunctivitis and keratitis have some discharge from the eye. Inasmuch as some of these diseases are benign while others are capable of causing great impairment of vision, and the differentiation between them is not always easy, it is imperative that these children be promptly referred to a physician in order that the correct diagnosis may be made and proper treatment instituted as early as possible. A slightly red eye, which to the layman is "just a cold in the eye," may be an iritis which, if not promptly placed under proper treatment, may result in great visual loss. Suggestions that boric acid solution or argyrol or any other remedy be used in such an eye before an accurate diagnosis has been made have had serious results. It is a safe rule to follow to insist that every red eye be seen by a physician as soon as possible to the end that early treatment may be instituted and permanent disability reduced to a minimum.

Conditions not accompanied by evident signs of inflammation include cataract, chorioretinitis, retinitis pigmentosa, retinal hemorrhages, hemorrhages into the vitreous (the semi-fluid, transparent substance which lies between the retina and lens of the eye), and diseases of the optic nerve. Also included in this class are those eye conditions which are secondary to general diseases, such as Bright's disease (inflammation of the kidney), diabetes (a disease marked by habitual discharge of an excessive quantity of urine), and brain tumor. In all these conditions a thorough and complete physical examination of the child to discover the underlying cause should be made and proper treatment prescribed if permanent visual disability is to be avoided. The interest of any child will be best served if the teacher, school nurse or social worker will, on discovering any abnormal eye condition, refer the child to his own family physician. Not only is he familiar with the child's previous medical and eye history, but he is more likely than anyone else to know of the family tendency

toward disease, constitutional and otherwise, which might have a bearing on the eye condition. He is, because of this fact, in a position to supply the eye consultant more promptly with facts of importance relative to the child's physical condition.

Mention has been made here of only a few of the eye conditions which affect the eyes of children of school age. Time does not permit mention of all the conditions which may occur at this period of life, so it might be well to proceed to those conditions which we meet most frequently and which present some of our greatest problems. I refer to refractive errors so commonly met with in school children either associated, or not, with muscular anomalies. Quite aside from the question of strabismus (squint, or crossed eyes) there are many children with defective vision in whom the defect is never noticed until the child's vision is recorded by the teacher or school nurse. These children have deceived themselves and their parents by squeezing their lids together in order that they might get clearer vision and thus the condition has passed unnoticed. Incidentally, a visual acuity of 20/20 in each eye does not mean very much except that the child has vision which comes up to a somewhat arbitrary standard, for these children may, in many instances, be suffering from definite eye symptoms despite their 20/20. Many of them, indeed, are greatly in need of glasses to give them comfortable vision; and this is, of course, essential if they are to do good school work and if they are not to put too great a strain upon their eyes during this period of their development.

Refractive Errors

If we now pass to the refractive errors, those conditions which will be benefited by the wearing of glasses, we find that they are divided roughly into three main groups: (1) hyperopia or farsightedness; (2) myopia or nearsightedness and (3) astigmatism.

Just to simplify we may say that hyperopia, or farsightedness, is that condition in which the child may or may not see distant objects well but he has difficulty in maintaining a distinct image of small objects for a long time. Here the image

of the objects is focused at a point behind the retina, and only by a great effort of accommodation can a clear image be had. As a result of this accommodative effort headaches and other symptoms of eye-strain develop. In myopia, on the other hand, vision for distant objects is greatly impaired but objects held close to the eyes are distinctly seen. Here the image focuses in front of the retina and efforts at accommodation would only make matters worse; hence no such effort is made and myopes, for this reason, suffer much less than do hyperopes from headaches. Astigmatism, or astigmia, is that condition in which the cornea or lens, or both, have different refractive power in different meridians. One meridian may be emmetropic and another, hyperopic or myopic; or any combination of these may exist. Depending upon whether the astigmatism is myopic or hyperopic, the image will be focused either in front of or behind the retina.

HYPEROPIA. This is the condition existing in all human eyes at birth. It may be said to be congenital and in its higher grades it is often hereditary. The tendency is for hyperopia to diminish gradually as the child grows older. Hyperopia is always accompanied by excessive accommodation in order that the image may be focused on the retina. Farsighted eyes are shorter from front to back than normal eyes. This excessive accommodation causes eye fatigue, headaches, and finally blurred vision when the accommodation relaxes entirely from overwork.

The association of accommodation with convergence readily explains why so many of these hyperopic children are cross-eyed. Despite the fact that the mother of the child insists that the eyes crossed following a fall or an acute illness, we believe that there is little or no casual relationship. Every child falls at some time or other, but not all of them, not even the hyperopes, develop a squint. Excessive accommodation, accompanied as it is by excessive convergence, is the prime factor in the production of this condition. In the beginning the squint may be noticeable only when the child is tired late in the day. Cases such as have been described are in most instances relieved of their strabismus if, by the wearing of proper glasses, the accommodation is sufficiently relaxed. It

is essential that in the examination of these children the muscles of accommodation be fully relaxed before the refraction is done. This is accomplished by the use of atropine, or other similar drug, which has the property of dilating the pupil and paralyzing, temporarily, the accommodation muscles. Even after the correction of the vision by glasses it will be found in many cases that the vision is subnormal in one or the other eye. This defect will be found in the eye which was in faulty position before the glasses were prescribed. The eye which is in a position of excessive convergence is for the time being temporarily out of use and, therefore, according to one school of thought, its vision fails because of disuse, much as an arm which has been put into a splint is helpless for a long time after the removal of the splint. Another school of thought insists that the vision in one eye was primarily poorer than that of the other and that the squint develops as a result of this condition. They support their contention by pointing out that eyes with corneal maculae which seriously impair the vision are prone to wander from the primary position. Whichever of these schools is correct, the fact remains that in cases of concomitant squint the vision is poorer in the squinting eye than it is in its fellow excepting only in cases of alternating squint in which either eye fixes alternately. Nurses, social workers and others interested in this problem will save oculists headaches and parents much money if they will remember that in many of these cases the vision in one eye cannot be brought up to normal.

When the eyes can be brought to a parallel position by the use of glasses, operation for the correction of the squint is not necessary. Occasionally when glasses do not have the desired effect, resort may be had to operation upon one or more of the ocular muscles. Parents and children should be impressed that operation for the cure of squint is purely a cosmetic measure and is without effect in improving the vision.

MYOPIA. If the natural tendency for hyperopia to diminish in degree is carried too far, myopia, or nearsightedness, will develop. In the normal development of the eye, as has been stated, hyperopia tends to be reduced as time goes on and by a diminution of the hyperopic reserve, the condition goes

over into myopia. As the eyeball elongates in its anteroposterior diameter, the refraction becomes less hyperopic, but in most persons a normal hyperopic reserve is maintained. It is only when the elongation of the eyeball goes too far that myopia develops. Other causes of myopia are corneal opacities, keratoconus, astigmatism, and heredity. There appears to be a racial tendency to myopia, especially in the Jewish people, in whom it is said that myopia is 40 per cent more frequent than it is in others. Statistics show that twice as many boys as girls are afflicted with myopia, but that the highest degree occurs in girls—also that most of the myopia seen in school children existed before they entered school. Be that as it may, it is certain that it progresses mostly during school years. It is, therefore, very important that nearsighted children be examined frequently, recording results on a chart or graph showing whether their myopia is progressing rapidly or not, so that a proper regimen for their eyes may be prescribed. It is generally conceded that visual capacity rather than visual acuity should be our guiding star in the care of these children. Myopia is not the direct antithesis of hyperopia because it may be accompanied in its later stages by distinct organic changes in the structure of the eye. As the eye elongates the retina and choroid are stretched and in some cases actual tears appear in the retina which are later followed by retinal detachment, a most serious accident. Muscular anomalies occur in myopic eyes, just as they do in the hyperopic, only here, since the accommodation is largely in abeyance, the tendency to converge is reduced to a minimum; where either eye assumes an abnormal position, it is usually in a position of divergence.

Treatment of this myopia should first of all be directed at the correction of the refraction by glasses. There should be a minimum amount of near work required. Outdoor exercise, by stimulating the activity of the superarenal glands, is credited with retarding the progress of myopia. A correct position of the body and head during study, through the use of proper desks and seats of proper height, is considered important by some authorities. The use of books with type of a size easily read is desirable, and well-diffused illumination, coming from a source behind the child, is advisable. Per-

haps as important as any of these is a proper restriction of the hours of study. Operation for the cure of myopia by removal of the crystalline lens from the eye has been advocated but is done rarely—only for the very high degrees. All cases of myopia should be examined three times a year and glasses changed as often as seems indicated.

As a conclusion to this discussion of myopia may I quote from the writings of Dr. Avery Prangen, of the eye department of the Mayo Clinic, as follows:

1. Myopia is an abnormal tendency to reduce the hyperopic reserve normally seen in children.

2. This abnormality is seen in both hyperopes and myopes, but it is troublesome only to the myopes.

3. This process may become arrested at any time, or continue unchecked.

4. Myopia is the result, not the cause, of this difficulty.

5. An hereditary tendency, together with age, is the chief factor. The importance of all other factors is debatable.

6. Constant wearing of fully correcting lenses is important.

7. Periodic examinations to keep the correction apace with any change in the myopia are a necessity.

8. General hygienic and dietary measures are indicated.

9. Restriction of unnecessary near work seems sensible.

10. Progressive myopia of the malignant type is rare. Its management and care are individual problems.

ASTIGNATISM. The third important refractive error which should be considered is astigmatism. Here the refractive power of the eye is different in different meridians, and glasses to correct one or more of the meridians at fault are prescribed for its correction. In this condition some of the rays of light entering the eye may fall on the retina or in front of or behind that structure, and, since they do not come to a focus on any one point, indistinct vision results and symptoms of eyestrain develop. Astigmatism may be regular or irregular. The former type may be corrected with cylindrical glasses but the latter is very difficult of correction except with contact lenses. This type of refractive error may also be classified as hyperopic, myopic and mixed. Excepting only contact glasses, all lenses for the correction of astigmatism

must be adjusted at the proper axis if clear and comfortable vision is to be obtained. Any bending of the frame or turning of the lens in its rim will throw the lens off its axis, and discomfort will result. For this reason it is important that such glasses be taken frequently to the optician for adjustment.

Eye Injuries

The most common causes of injuries to the eyes are foreign bodies in the cornea, the common B B shot injuries from an air-rifle or bean-shooter, injuries from fireworks, and those from chemical caustics. Here, if ever, is it true that "an ounce of prevention is worth a pound of cure." Many eyes are lost annually because of fireworks and B B injuries alone. Perhaps a few examples will make this statement more impressive. About five years ago a fine boy of about 14 years of age was curious to know what would happen if he placed a lighted firecracker under an ordinary tin can, so he tried it. The can did not go straight up in the air as he had expected, but instead it struck one of his eyes damaging it beyond repair. We tried for several days to save the injured eye, but this proved unsuccessful and the eye was enucleated. Despite this operation he developed sympathetic ophthalmia in the other eye three weeks after he left the hospital. He was again hospitalized and the second eye treated. The result was that this eye was saved, but with vision which amounts to only about 20/200. Another instance of a different nature, but none the less tragic, concerns a girl of about 10 years of age who, while sitting on the porch of her home, was struck in one eye by a B B shot from an air-rifle in the hands of a neighbor's boy. The iris was torn away from its attachment to the ciliary body, and within a few days there was present a traumatic cataract. After operation for the cataract she had a corrected vision of 20/40, but now, 12 years after the injury, the pupil is filled in by a dense membrane and she has no useful vision in that eye. In addition, the injured eye is in a position of noticeable divergence, and this constitutes a very marked cosmetic defect in a rather attractive young woman now 22 years of age. These two examples of preventable eye accidents emphasize the need for laws and regulations outlawing dangerous playthings.

Injuries resulting from chemical caustics entering the eyes are seen not uncommonly in the chemical laboratories of our high schools and colleges, as a result of poorly planned and poorly executed chemical experiments. The results in some cases are extremely disastrous. Free flushing of the eye with quantities of water and the application of a cold, wet, clean compress should be immediately followed by sending the child to a physician.

As the injuries here enumerated seem bound to happen, it is incumbent upon those who see them first to meddle with them as little as possible. No attempt should be made to remove foreign bodies with a knife, toothpick or other handy object. Such eyes should be kept clean, a sterile or at least a clean dressing applied, and the child sent to a physician. If the eyeball itself has been injured, cleanliness again is the watchword. Do not handle such eyes more than is necessary to apply a clean dressing and bandage to keep it in place, being careful not to have the bandage exert any pressure upon the eye lest some of the contents of the globe be lost.

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